UPSILON PEGASIDS: Hyperbolic Meteors From An Elliptical Comet Orbit Harold Povenmire Florida Institute of Technology 215 Osage Dr. Indian Harbour Beach, FL 32937

Hyperbolic orbits for comets are well established. Approximately 10 percent of all comets going through perihelion leave the solar system hyperbolically. Comet Bowell has an eccentricity of 1.057322 (1). Hyperbolic interstellar dust particles have been confirmed by the Ulysses spacecraft and by radar (2) (3). Sporadic hyperbolic meteors have been reported (4). However, Kresak has clearly shown that an annual or periodic, hyperbolic meteor shower is impossible (5).

It was therefore ironic when the preliminary orbit of the Upsilon Pegasid meteor shower indicated that it might be slightly hyperbolic. This problem was compounded when the two brightest and best documented two station Upsilon Pegasid meteors turned out to be slightly hyperbolic. These meteors and their eccentricities were: EN 190882A (1.0179) and Babdzhanov 582604. (1.04) (6) (7) (8). Other two station Upsilon Pegasids had their eccentricites rounded off to 1.00. This mystery was unresolved until Alan Gilmore, now of Mount John's Observatory provided the probable solution (9). The parent comet of the Upsilon Pegasids is in a high inclination, long period, elliptical orbit. Ceplecha estimated its minimum period at approximately 4700 years (10). This would make its eccentricity at least .9993.

Using math models, it was not difficult to see that only small pertubations were necessary to accelerate a fraction of the meteoroids from elliptical to hyperbolic orbits as they appproached the Sun.

Three pertubations were analyzed: (1) impact (2) nuclear rotation (3) nongravitational forces (outgassing). While any one of these could provide the necessary acceleration, it probably was a combination of these factors. Based on this study, it is probable and to be expected that any long period elliptical comet will produce some hyperbolic meteors from their ejected particles.

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